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AMERICAN FERTILIZER

"That man is a benefactor to his race who makes two blades of grass to grow where but one grew before."

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World Food Needs and Who Should Supply Them*

By CHARLES J. BRAND

Executive Secretary and Treasurer, The National Fertilizer Association

WE NOW help and will continue to help other food-exporting countries to supply the food deficit of European and possibly of Asiatic and other countries. Although military food purchases accounted for 13 per cent and Lend-Lease and other exports about 12 per cent of our total food production in 1943, our civilian population consumed 5 to 7 per cent more food in 1943 than the average in the pre-war period 1935–39, and only about 2 per cent less than in 1942. Our food production in 1943 was the largest in history, and in this current year it is expected to be even higher if yields are normal. The farmers of America are doing their part.

We Can Help

Nutritionally our civilian diet in 1943 was probably superior to the pre-war diet of 1935–39 and, with a few exceptions, the per capita consumption of the major nutrients—calories, proteins, vitamins, and minerals—was as large as in 1942. Food purchases for the approximately 11,000,000 men in our armed forces total about twice that for an equal number of civilians. Therefore, when the war is over, another 8 per cent of our total food production might be available for export. This, plus the 12 per cent for Lend-Lease and the 5 to 7 per cent which our civilians are consuming above pre-war levels, might appear to leave 25 to 27 per cent of our present rate of food production available for the rest of the world. This is sufficient food for about 43,000,000 to 50,000,000 people on the basis of our pre-war food consumption. But it is not as simple as that, nor is it likely that the surplus will approach the quantity required for the 100,000,000 to 200,000,000 persons which was mentioned in the press following the Hot Springs Food Conference nearly a year ago. Such figures assume that we shall continue to produce at the same artificially high level that has prevailed under war conditions, and that the rest of the world will continue at a low level. Such is not history nor human nature.

United States Not a Net Food Exporter

According to Dean W. I. Myers, of the New York College of Agriculture, at Cornell University, during World War I food exports increased from about 6 or 8 per cent of the production in the pre-war years to 13 per cent in 1915 and 17 per cent in 1919. About half of this increase came from higher production and the other half from reduced civilian consumption made possible by changes in eating habits.

Even with 33,000,000 more people to feed here at home now than in 1920, our total food exports from 1935 to 1939 varied from 2 to 5 per cent of production. We produced less and ate about 8 per cent less per capita than in the corresponding period just prior to World War I.

The people of the United States constitute the world's best market. The American private enterprise system has worked well for more than a century. In ordinary times in effect, people eat what food they want and then we export the remainder if any. Hence, as per capita food production declined, food exports decreased and food imports rose, and for 15 years prior to the present war our annual food imports *exceeded* our food exports.

*Supplement to ATAE NEWS (44-1), March 1944, issued by American Trade Association Executives, Washington, D. C.

Exports of crude foodstuffs dropped from 9.7 per cent (1921–1925 average) of total exports to 3.5 per cent in 1939.

Food production in 1943 was 32 per cent larger than the average of 1935–39 because of favorable weather conditions and sufficiently high farm prices to induce maximum effort towards production.

Export Surpluses Confined to Small Number of Commodities

Many additional millions of people must be fed during and after the war. Their diet must consist largely of wheat, soybeans, dried peas and beans, corn, vegetables, and other crop products, plus a relatively small amount of dairy and poultry products. However, this nation is normally an exporter in quantity of only wheat, cotton, tobacco, lard, processed meats, and certain fresh and dried fruits. Wheat must be exported in competition with that of Canada, Australia, and Argentina. Our pork products are in competition with those from Canada and, within two years at most after the end of the war, those of Denmark, Sweden, and still other countries. Beef exports will again be faced with those normally coming from Argentina, Canada, New Zealand, and Australia. Even any hope of large exports of dairy products from the United States must face exportable surpluses from New Zealand, Australia, and Northern Europe, as well as Canada and possibly South America. While cotton, our chief agricultural export, is not edible, except for the oil, the world is now faced with one of the largest carry-overs of raw cotton in recent history. India, Egypt, Brazil, and other cotton-producing countries will wish to regain or maintain their share of the world market. Tobacco presents a rather optimistic picture as do some of the vitamin-concentrated foods, milk, meats, and some dehydrated vegetables.

Experience Under Lend-Lease

Pre-war Europe as a whole imported about 10 per cent of its food. Loss of imports and decline in production have resulted in 15 to 20 per cent less food available for consumption under war conditions. Before World War II United Kingdom produced about 33 per cent of her food. Dr. John D. Black, in his pamphlet, "World Needs for U. S. Food and Fiber," emphasizes that under war conditions Great Britain has made a great effort to become self-supporting in food production. In the first year of Lend-Lease operations farm products made up 47 per cent of total Lend-Lease shipment; the second year only 21 per cent. Great Britain has taken 27 per cent of our Lend-Lease food materials, Russia 8.3 per cent, Africa and the Middle East 3.1 per cent, China and the Australian area only 2.4 per cent. On the other hand, there has been considerable "Lend-Lease in reverse." Our fighting forces in the South Pacific received more beef from Australia and New Zealand in 1942 than we sent to all our allies, and in the last half of 1942 Great Britain released more supplies for our troops quartered with her than we did. Food is now being shipped from Great Britain to Russia and China.

Before the first World War, Russia was usually a net exporter of food and was self-sufficient until 1941. By September, 1942, Russia had lost land which had formerly produced 79 per cent of her winter wheat, 11 per cent of her spring wheat, 31 per cent of her rye, 54 per cent of her vegetable oils, 56 per cent of her hogs, 70 per cent of her corn, and similarly large percentages of her sugar beet, potato, and cattle producing potential. Presently, much of her cereal-producing land has been regained, and as the people of Russia have lived more nearly on wheat and other cereals than even the Chinese upon their rice, it is certain that Russia will step up her production as quickly as the twice-scorched earth will permit. When the war is over and farm machinery production is back to normal, the Soviet, regardless of its future boundaries, will be exporting large quantities of wheat, rye, dairy, and livestock products. Russia has nearly two and one-half times as much land area as the United States, and her resources are still largely undeveloped. With tremendous deposits of phosphates in the northern part of the country, with potash available from her own deposits and from Germany and France, and with many nitrogen plants created previous to and during the war, she will be able readily to increase food production even more.

Of the food sent to Russia under Lend-Lease, meat and animal fats have made up 30 per cent of the total; wheat and flour about 25 per cent; sugar 17 per cent; beans, peas, rice, and cereals, 12 per cent; vegetable oils 6 per cent; and dairy products 5 per cent. Also nearly all of the dehydrated vegetables shipped under Lend-Lease go to the Soviet Union. The above foods, with the exception of sugar and vegetable oils, are normally exported by Russia. Clearly, it will be only in famine years, should they occur, that we shall need to send food to Russia once the war is over. Instead, we shall need to be prepared to meet her competition in the markets of western, central, and southern Europe.

According to Sir John Russell, distinguished director of the Rothamsted Experimental Station, Great Britain was producing less than 35 per cent of her food supply before the war. She is now reported to be producing about 67 to 70 per cent. Her acreage plowed has been increased from 8,900,000 to 14,500,000 acres. The potato acreage has been nearly doubled. Mutton production has been increased 10 per cent, beef production is about the same, while pork production has been cut in half and other livestock about one-fourth. She received from us about 10 per cent of her meat (approximately all pork), 20 per cent of her edible fats, and about 20 per cent of her other protein foods, such as cheese, dried and evaporated milk, and dried eggs. However, we furnish less than a fourth of her total food imports. She obtained most of her wheat from Canada, Australia and Argentina. Large quantities of meat and cheese and other foodstuffs came from New Zealand, Australia, Argentina, and other South American countries. Is it not logical to assume that when the war is over the Commonwealths, Dominions and colonies will continue to supply most of her imported food, and that her own agricultural production may by necessity remain relatively higher than in the pre-war years? Certainly for reasons of security and to achieve a better balanced national economy as between industry and agriculture, Britain in the future should maintain a higher agricultural level.

Aids to Production Will Be Available

It appears that for a year following the close of the war, the liberated countries, and perhaps the Axis countries as well, will need an increased supply of cereals, fats, and sugar, and some dairy and other livestock products. The purchasing power of the needy nations and the generosity of the victors will determine how much they may have. Shortages can logically be made up from the surplus stocks built up by the United States or others of the United Nations. The need will not likely be as great nor extend over as long a period of time as some think. We may assume that if each of these countries is given the benefit of an adequate supply of seed, farm machinery, fertilizer, and the labor of the disbanding armies and returning prisoners, production will soon be back to the preexisting normals based on individual tastes and national customs. The twice-devastated area of western Russia might prove an exception. We cannot change peoples' food habits, developed by centuries of environment and habit, in a few years or through a series of conferences on raising nutritional standards.

The wartime shortage of fertilizer, especially phosphates, has probably reduced the productivity of European fields between 5 and 10 per cent. With a return to the free and normal exchange of European and North African supplies of fertilizer, production per acre can be stepped up that much or more within a year or two after the war's end. The development of farm machinery in Great Britain has been enormous during the past four years, and, so far as known, her fertilizer supplies will be adequate for further increased production.

Restoration of Europe's Livestock Industry

Cattle numbers in Germany and northern Europe have probably declined 10 per cent, while in the other occupied countries perhaps 25 per cent. It is estimated that the number of pigs is 30 to 70 per cent less than prior to the war. Pig and poultry populations can be increased rapidly under normal conditions, but cattle numbers may take four to seven years to return to normal. The low number of cattle has caused a decrease in natural manures available, and consequently more fertilizer will be required; also more tractors and trucks to replace the draft use of livestock. It appears that our greatest opportunity for exporting food to deficiency areas after the first year would be of livestock products which must, of course, be sold in competition with those from South America, Australia, New Zealand, Ireland, Denmark, and even Russia. As Europe shifts back to her usual agricultural level, it would appear logical to return to the normal, pre-war practice of shipping Europe some 11,000,000 tons of livestock feed for her draft animals and to increase production from the existing dairy herds and poultry flocks.

Pre-war Europe normally received one-fourth of her total dietary needs from foods of animal origin, meat, eggs, cheese, milk, and the like. Under Nazi occupation foods of animal origin make up only one-sixth or one-seventh of Europe's total, while the consumption of potatoes and fresh vegetables has increased greatly. To help fill the great gap in animal products and oils caused by the cutting off of imports and decline in lard and butter production, the Axis has vuite successfully increased the production of oilseeds, particularly rapeseed and linseed, in the northwestern part of Europe, and sunflower seed in the southeast. It is likely that such food production will be continued for a time after the

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Commercial Nitrogen Benefits Pastures and Meadows*

By D. S. FINK, Ithaca, N. Y.

THE improvement and maintenance of permanent pastures has been largely confined to top-dressing with lime and mineral fertilizers. This treatment favors the growth of white clover, which, in turn, is relied upon to meet the nitrogen requirements of all the pasture vegetation. Table I, based on data by J. A. Bizzell, Cornell University, clearly shows that a white clover-Kentucky bluegrass association can be made to produce as much dry matter and protein an acre as a pure stand of Kentucky bluegrass treated with about 130 pounds of nitrogen (N) an acre.

TABLE I
SIX-YEAR AVERAGE ANNUAL DRY MATTER AND PROTEIN YIELD IN POUNDS AN ACRE FROM A KENTUCKY BLUEGRASS-WHITE CLOVER ASSOCIATION VS. KENTUCKY BLUEGRASS UNDER FOUR LEVELS OF NITROGEN FERTILIZATION

	No N	60 lbs. N	120 lbs. N	180 lbs. N	White Clover
Dry matter	1,394	2,666	3,811	4,665	3,956
Protein	225	481	769	1,038	811

Sometimes white clover does not respond rapidly enough to mineral fertilization, especially during the early stages of pasture improvement, to give the increased pasturage urgently needed. Under such conditions, nitrogen fertilizer, in addition to mineral fertilizers, may give three-fold or larger increases in pasturage within a few weeks. This is well illustrated in Table II, which shows nitrogen with minerals, giving a four-fold increase in pasturage available on June 4th. This trial was conducted on a pasture that was liberally treated with superphosphate in 1939.

Permanent pastures usually produce more feed when nitrogen fertilizer is used in addition to mineral fertilizers, and grazing management is such as to maintain a good proportion of white clover in the turf. For example, several long-time pasture experiments in the Northeast show that nitrogen, in addition to minerals, produces about 40 per cent more pasturage, or 20 additional cow-pasture days an acre, than fertilization with minerals only.

Some of this increased production, due to the use of nitrogen fertilizer, is accounted for by earlier grazing. Nitrogen fertilizer stimulates pasture growth early in the season, and, on reasonably well-drained soils, this may allow cattle to obtain a fair amount of feed from pasture a week or 10 days earlier than when the fertilization is from minerals alone. It is important, however, for the farmer to use good judgment when attempting to take full advantage of this early grazing. The new,

TABLE II
THE YIELD OF PASTURE VEGETATION ON JUNE 4, 1943, FOR TREATMENTS APPLIED MAY 13, 1943. TRIAL CONDUCTED AT CANTON, N. Y.

Treatment in lbs. an acre of			Yield (green weight)
N	P_2O_5	K_2O	in lbs. an acre
60	60	60	8,271
..	60	60	1,929
..	..	60	1,535
....No treatment....			1,560

green grass is mostly water, and is not abundant enough for the dairy cow to obtain the necessary pounds of dry matter for maintenance alone, much less for milk production. Because of this it is important to feed hay liberally when cows are first turned to pasture.

The remainder of the increased production from nitrogen-fertilized pasture comes during the latter part of May and in June, or at a time when permanent pastures are normally at their flush peak of growth. Obviously, if additional pasture is not needed at this time, only limited use can be made of nitrogen fertilizer to get earlier grazing. Generally speaking, not more than about one-third acre of permanent pasture per cow should be top-dressed with nitrogen fertilizer, and this acreage is best limited to areas that can be grazed early in the season.

More Feed from Annual Pastures

It is common knowledge that permanent pastures do not produce feed rapidly enough during midsummer and most fall periods to meet the pasture requirement of cows in full

*Reprinted from "Farm Research," April, 1944.

milk. The most economical mid- and late-season pasture appears to be the aftergrowth from meadows that contain a high proportion of legumes, such as Ladino clover or alfalfa. Until such time as a sufficient acreage of aftermath legume pasture is made available, however, it is necessary to rely on such annual pasture crops as the small grains, millet, or Sudan grass. These crops respond markedly to nitrogen fertilization, and they may be liberally fertilized with nitrogen when they are to be harvested by grazing. In several trials in northern New York, this past summer, 60 pounds of nitrogen to the acre, applied to oats and to Sudan grass, more than doubled the amount of grazing obtained per acre of these crops.

Every effort should be bent towards increasing the acreage of reasonably permanent hay-type legumes, primarily because they give abundant midsummer and fall pasture in addition to a heavy first crop of hay. The magnitude of this job is apparent in view of the fact

TABLE III

THREE-YEAR AVERAGE ANNUAL HAY YIELD OF ALFALFA-GRASS ASSOCIATIONS UNDER THREE LEVELS OF NITROGEN FERTILIZATION

Nitrogen applied annually, lbs.	Hay yield, lbs.
None	4,992
40	5,264
80	5,122

that barely 10 per cent of New York's hay acreage is established to alfalfa, Ladino clover, or other reasonably permanent legumes.

Fertilizer nitrogen is not needed for high production of meadows when legumes comprise 50 per cent or more of the total vegetation. This is clearly demonstrated in fertilizer investigations conducted at Churchville, N. Y., by G. H. Serviss. Nitrogen top-dressings (Table III) on alfalfa-grass associations, in which alfalfa comprises 50 per cent or more of the total vegetation, show no practical advantage in terms of increased production.

Not more than one-third of New York's total hay acreage, however, produces chiefly legume hay. The remainder is grass hay, chiefly timothy. In fact, the proportion of grass hay is increasing, and for the next several years may comprise considerably more than two-thirds of our total hay. For example, in many parts of the Northeast, there was a 40 per cent reduction in meadow seedings in 1943, and this reduction in seedings is expected to continue in 1944. A marked deficiency in the supply of legume seeds for 1944 plantings appears certain to reduce further the acreage of legume hay to be harvested in 1945.

More Hay from Timothy

The response of timothy to nitrogen naturally varies widely, depending upon the age of the stand, soil type, and especially upon previous soil management practices, together with the amount of phosphorus and potash used in association with nitrogen. The results of many experiments conducted throughout the Northeast clearly show, that, generally, the farmer may expect ¾-ton increase in timothy hay upon the application of about 50 pounds of nitrogen an acre.

It has been variously estimated, in view of more and more grass hay on farms, that the Northeastern livestock farmer will need to use 25 to 50 thousand tons of nitrogen for top-dressing grass meadows if total hay requirements are to be met. Such estimates may be questioned, but they bring to light the urgency of meeting hay requirements.

The supply of nitrogen fertilizer is greater than last year. Most of the nitrogen fertilizer for top-dressing purposes will be in the form of ammonium nitrate. This material is relatively new, although it is known that crops respond as well to ammonium nitrate as to other forms of chemical nitrogen. The physical properties of ammonium nitrate have been improved considerably, and, with reasonable care, it can be shipped, stored, and handled without trouble. Although ammonium nitrate costs more per ton, $50 plus freight, it is, because of its higher content of nitrogen, 32.5 per cent, one of the least expensive forms of nitrogen.

Nitrogen fertilizers are rapidly becoming more plentiful and lower in cost. Their judicious use may allow cattle to be turned to pasture earlier in the season; thus affording a substantial saving in concentrates. Annual pasture crops give considerably more pasturage when liberally fertilized with nitrogen. Grass hays markedly respond to nitrogen top dressing. The use of nitrogen fertilizer on grass hay does not detract, but rather encourages and makes safe the production of legume hay by insuring the production of satisfactory yields of hay if there is a reduced acreage of legume hay. Applications of 100 to 200 pounds per acre of ammonium nitrate, or approximately 30 to 60 pounds of nitrogen, is the range of application with pasture and hay crops for most economical returns.

Potash Allocation Order Amended

On April 3rd, the War Production Board issued an amended edition or revision of Allocation Order M-291, which provides for the allocation of potash. The principal changes made by the revision are:

(a) The addition of "Period Four" and "Period Five" to extend the operation of the order through May 31, 1945.

(b) The omission of the requirement that a person requiring authorization to accept delivery of potash during any period must show in his application therefor his estimated inventory at the beginning of the period.

(c) The omission of the requirement that on or before the seventh day following the commencement of each period, each person who has applied to WPB for authorization to accept delivery of potash during such period must file with WPB a report as to his inventory at the beginning of the period.

With certain exceptions, no "supplier" may deliver potash to any person, and no person may accept delivery of potash from a "supplier," except by specific authorization of WPB.

"Supplier" includes producers, importers, and wholesale distributors of potash. It does not include fertilizer manufacturers to the extent that they use potash as a raw material nor retail sellers of potash. Specific authorization is unnecessary for deliveries of mixed fertilizer containing potash, or for retail deliveries of potash made by fertilizer manufacturers, agents, or dealers.

Allocations of potash will be made according to periods. Periods 1 and 2 have expired. Period 3 (the current period) will expire May 31, 1944. Period 4 means June, 1944, to March, 1945, both inclusive. Period 5 means April and May, 1945.

In general, the allocation procedure will be as follows: (a) A person requiring authorization to accept delivery of potash during any period (whether for consumption or resale) will file an application (on Form WPB-2945—formerly PD-600) with WPB. This application will show, among other things, the quantity of each potash salt desired and the purpose for which it is to be used. (b) WPB will issue an authorization showing the quantity of potash the applicant may receive during such period. (c) The applicant will place his order or orders for potash, within his authorized total, with a supplier or suppliers. (d) The supplier or suppliers will apply to WPB (on Form WPB 2946—formerly PD-601) for authorization to make delivery, specifying, among other things, the customer's name and the quantity of each potash salt proposed to be delivered. (e) WPB will issue to the supplier an authorization with respect to deliveries that may be made. WPB, however, without adhering to this procedure and at any time, may issue directions with respect to deliveries or uses of potash.

To give WPB information as to the total requirements of potash (for use in making equitable allocations to individual applicants), all applications for authorization to accept delivery of potash in any period must be filed well in advance of such period. The latest dates for filing such applications (on Form WPB 2945) are: For Period 4, May 1, 1944; for Period 5, January 15, 1945. WPB states that although the order does not specify the latest dates for suppliers to file applications for authorization to deliver potash in Periods 4 and 5, it is expected that the same procedure will be followed as in Periods 1 and 2. Such applications (on Form WPB 2946) are to be filed as soon as practicable after the beginning of the period.

As to the quantities of particular grades of mixed fertilizers to be manufactured from potash or the quantity of potash to be made available for direct application to the soil, authorizations will conform, as nearly as practicable, to needs as determined by the Director of Food Production, U. S. D. A.

Each person who has been authorized to accept delivery of potash must use it, unless otherwise directed by WPB, only for the purpose authorized.

Specific WPB authorization will not be required in the following cases:

(a) Delivery may be accepted from all sources, in any period, of not more than five tons of potash, in terms of K_2O content, for each month in such period. A supplier may deliver potash in any period to any person furnishing a certificate to the effect that the potash ordered for delivery in such period, taken with all other potash delivered or to be delivered from all sources in such period, does not exceed five tons for each month of such period, in terms of K_2O content. This is not applicable, however, if the supplier knows or has reason to believe that the certificate is false.

(b) Prior to receipt of specific authorization for deliveries in any period, a supplier may deliver in such period to any person not more than 20 per cent of the quantity of any potash

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Conservation: No. 1 Postwar Job

By CLAUDE R. WICKARD, Secretary of Agriculture

Remarks before the Rotary District Conference at Reading, Pa., Monday, April 17, 1944

AS SECRETARY of Agriculture, I have occasion to speak on a great variety of subjects, but there is no subject I can discuss with more enthusiasm than soil conservation.

The conservation of soil and water resources is one of the imperative jobs of America. There is no political, economic, social, or scientific disagreement about this fact. Fertile soil is a matter of national concern, and everyone interested in agriculture wants to see that soil protected and improved. It is part of the physical foundation of our country and no one wants to see it washed away.

Nevertheless, it has been washing away—in great quantities, from great areas, and at great speed. No other nation has lost so much soil in so little time. Ever since the first settlers landed on our shores, we have been plowing the soil and exposing it to the wind and rain. Each year, as more and more land was opened up, we lost more and more soil. Erosion became progressively worse and worse, ruining more land, and at a faster rate, each year. When this continent was first being settled it was covered, as an average, with about nine inches of productive top soil. Today the average depth of our topsoil across the country is only about six inches. That is the average. In too many places, the topsoil is gone altogether. Only raw clay, or sand, or gravel is left. And in too many places, gullies have cut the land to shreds. It's mighty hard to get food out of gullies.

Let me tell you in other terms what erosion has done to us. It has ruined for any further cultivation some 50 million acres of cropland. That is an area equal in size to all the land in Maine and New York, and equal to, at least, one-eighth of our total present cropland. Before erosion wrecked it, this was some of the finest land in the country. Today it is producing no food for the war and tomorrow it will produce no food for the peace.

That is not all. Erosion has almost ruined another 50 million acres of cropland. Just about all the topsoil is gone from this land and it is riddled by gullies, but here and there a few people are still trying to farm some of this bankrupt land. I need hardly tell you they are attempting the impossible. Gullied land with little or no topsoil will not support an American standard of living.

Still another 100 million acres of cropland have lost more than half of their productive topsoil. And on yet another 100 million acres of cropland, the erosion process is under way. In short, erosion has already damaged more than two-fifths of all the cropland of the United States. The surveys show that additional hundreds of millions of acres of range and pasture land have also been hurt by erosion.

What I am talking about is a major threat to the prosperity and to the very life of the country. Some people regard it as our No. 1 peacetime enemy, second only to our wartime enemies—the Axis nations. It is a cancer in our agriculture and a drain on our pocketbooks. Each year erosion costs the United States in the neighborhood of $3,844,000,000 in wasted soil, railroad and highway damage, flood damage, abandonment of farms, reduced reservoir capacity, and other losses. And where erosion is permitted, the standard of living soon goes down. Around the world, since the beginning of history, poverty has followed in the wake of erosion.

No, erosion is not new and it is not a devil confined to the United States. There is scarcely a nation on earth without its erosion problem, and some face a tougher job than we do. Here in this country nothing really effective to halt the inroads of erosion was done until 10 years ago, when the blowing soil from the Great Plains began blotting out the sun at midday over State after State. It was only then that any great numbers of people recognized the urgency and the emergency proportions of the soil erosion problem in our country.

To be sure, there had been terracing programs in the South; and from time to time, in

different States, there had been stress on crop rotations, and cover crops, and fertilizers, and diversion ditches, and on a few other single practices. But no attempt had been made to put these several single measures together to do a complete job of erosion control, according to the needs and capabilities of the land itself. As a matter of fact, in most places it was mighty hard to find any interest in erosion at all. No interest in erosion, mind you, at a time when some two-fifths of the cropland of the country was being damaged and 50 million acres of our best cropland had already been washed away! Some agricultural leaders were even reluctant to admit that erosion took place in their States.

The Soil Conservation Service

Then Congress established the Soil Conservation Service to carry on a nationwide action program against erosion, which was truly described as a national menace. By that action an effort was made to do something positive about a problem which had been seriously and tragically neglected until that time. Thus for the first time in history, a program was developed and tested beyond doubt which protects the land against winds and water even while the land is being used for crop production.

Through the work of the Soil Conservation Service of the U. S. Department of Agriculture—and by that I mean the Service technicians working directly on the land with individual farmers and groups of farmers—nearly 10 per cent of the farmland of the country has already been protected against erosion. By all reasonable reckoning, this is permanent and complete protection. I have heard of no farmer who ever seriously tried soil conservation and then gave it up.

Farmers approve of this program. It makes good sense, for conservation farming has demonstrated that it not only protects the soil but increases yields per acre at the same time. On thousands of farms in all parts of our country, conservation farming has resulted in an average 20 per cent increase in production per acre. That's a worthwhile increase any time, but especially in wartime. And this is accomplished with little or no additional equipment, time or labor. As a matter of fact, many farmers say that conservation farming is easier and that it takes less fuel and less time than the old-fashioned methods.

What is conservation farming? Dr. Hugh Bennett of the Soil Conservation Service has defined it as "common sense farming with scientific methods." It means treating every acre of land according to its individual needs, and using every acre according to its individual capabilities. Each acre of land, like each human being, is different from the next one. To get the best from it, it must be handled in just the right way. If there were some simple remedy, for the problems of the land, that could be applied everywhere, in a standardized treatment or formula, the job of soil conservation would be relatively easy. But there is as much variety in erosion as there is in the landscape.

There are some 59 major soil conservation practices now being used to stop erosion, conserve rainfall, and improve the land. These practices include terracing, contouring, strip cropping, grassed waterways, and so on. Each one is used to meet a given need or to provide a desired result.

The trained soil conservation technician prescribes for the land just as a physician prescribes for his patients. In a sense, soil conservationists are "land doctors." These men have learned that half-way measures will not do the job. Each conservation measure applied to the land is designed to support another one, and the conservation work on one farm is carried out with an eye to the next farm—and to all the farms farther downstream. This viewpoint is essential, for erosion has no respect for boundary lines. Gullies do not stop at fence lines or even for county or state lines, and neither do dust storms.

We Lead in Soil Conservation

All this means that modern soil conservation demands the utmost in technical excellence to succeed. And all of us may well be proud that today the United States is leading the world in soil conservation. Farmers, scientists, and agricultural leaders of other nations come here to study what we have done, because it is the first time anything so effective has ever been done. Other countries are following our lead. They are adopting our methods—our technology and our approach to the erosion problem. More than one country has established a Soil Conservation Service, modeled after our own.

The services of our soil conservationists are being requested by the governments of our allies and whenever we can spare one of these men, we "lend" him, in a manner of speaking, for a short time. I regard this as right and as a tangible part of our good-neighbor policy. Moreover, I believe it altogether proper that the achievements in soil conservation, which were pioneered and developed here, should be made available to all.

Now despite the amazing progress which we have made in the last 10 years, erosion of our irreplaceable soil resources is still a national menace. Erosion is still proceeding at a rate faster than our constructive work to stop it. Yet there still remain a few people who say that action is not necessary. Let us return, they say, to the educational processes. Actually what they are saying is that we should return to the do-nothing policy of the past which was responsible for the very predicament we are in today.

I have no quarrel with the educational processes. They must be utilized to the fullest possible extent. There is more need for education in soil erosion and soil conservation today than ever before. But we are not faced with alternatives. We are not forced to take either education or action. We need both—more of both. Education and action in soil conservation must proceed hand in hand. It is the only way we shall halt erosion in time.

Cooperative Effort Needed

I also hear some folks remark that when a piece of land belongs to a farmer he has a right to do with it whatever he wants. That attitude on the part of many sincere people reflects the love for action without restraint which has always characterized the American people—plus what, until recently, appeared to be our limitless natural resources.

In other words, so long as there was always new land to be had for the taking it was of no concern to a man's neighbors, or his children or the rest of society if this man farmed his land out in a few years. He moved on, or his children moved on, to new territory and started the process all over again.

Likewise, in those days, the problem of law enforcement was pretty much a matter of individual concern. Each looked out for himself and his own, while justice and social responsibility figured more or less incidentally, if at all, in life's simpler pattern.

But times have changed, as we all know, and I prefer to believe that we are all stewards of our natural resources. Ownership of land does not carry with it the right to destroy land; it does carry with it the responsibility to protect and improve land. Every farmer holds his soil in trust for generations yet to come.

The question is often asked why farmers need help to conserve their soil when soil conservation is such an obviously good thing that the average farmer ought to do it himself in his own best interests. The answer is that the average farmer is no more prepared to solve all his own erosion problems alone than he is prepared to solve all his own legal or medical problems alone. He needs specialized, scientific assistance, and the government is making that assistance available because the nation also has an interest and a responsibility in the protection of soil resources.

For example, to handle excess water safely, on sloping land, it is usually necessary to build terraces or ditches. The terraces need to have protected outlets, or the water will begin to cut into the soil. And even after you have moved the water safely off the field, you need a place to put it. For the farmer to solve such problems of water disposal all alone, he would need to have some degree of proficiency in engineering. But most farmers do not have this specialized type of training. Most farmers are not engineers, or hydrologists, or agronomists or foresters. They are farmers, and when it comes to a matter of dealing with an erosion problem on their land, they usually require the help and advice of a trained soil conservationist if they are to arrive at the correct solution.

Soil Conservation Districts

I want to tell you how this technical service is made available to farmers, and to do that I must tell you a little bit about soil conservation districts.

Soil conservation districts are subdivisions of the State. They can be formed only in those States which have passed laws authorizing farmers to form them. They can be formed only in the manner prescribed by these laws. Farmers wanting to organize a district must submit a petition to the State Soil Conservation Committee. The Committee then holds a public hearing on the question in the area proposed for district organization. If the public hearings show a favorable sentiment, the question is then put to a vote of the land owners and land operators in that area. In other words, the farmers themselves decide whether or not there is to be a district for soil conservation.

A few individuals from a bygone era, who are more concerned with personal power than with progress, raise a shrill cry once in a while that these districts are arms of the Federal Government and "regiment" farmers. I find it hard to call this process "regimentation."

If the farmers vote favorably on the establishment of a soil conservation district, it becomes a legal subdivision of the State. However, it does not have the authority to tax or to issue bonds. In most States, the laws provide that district affairs shall be directed

(*Continued on page 24*)

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Principal Articles in This Issue

New St. Regis Bag Plant

The St. Regis Paper Company of New York has recently completed plans for the immediate erection of a new multiwall paper bag manufacturing plant in North Kansas City, Mo. Because of the ever growing demand for heavy duty multiwall paper bags to carry foodstuffs, chemicals, fertilizers and building materials for essential civilian requirements, sustenance of the armed forces and for Lend-Lease, the Government has approved the full-speed-ahead completion of this project. The building contract has been awarded to the North Kansas City Development Company. Construction will start at once and the plant will be in full operation early in 1944, equipped to make sewn, pasted, valve and open-mouth bags and shipping containers, as well as small flour bags and sugar pockets. The new plant will be the eleventh bag factory operated in the United States by St. Regis Paper Company, pioneers in the manufacture of heavy-duty multiwall paper bags for domestic and overseas shipments. St. Regis also manufactures a complete line of automatic bag packing machines and bag closing equipment. In addition to the network of eleven bag plants in this country, St. Regis has three in Canada, three in South America and before Pearl Harbor, also operated a plant in Japan.

The Kansas City factory will be a one-story building of modern design, following the War Production Board's war construction specifications. The most modern straight line production equipment can be accommodated in its 320 ft. length. Rolls of kraft paper will come in at one end and the finished bags go out the other. Two hundred and fifty people will be employed in the exclusive manufacture of rugged multiple-walled paper shipping sacks which are now being used to package more than 300 widely varying products efficiently and economically. The specification kraft paper used in the construction of these moisture-resistant bags will come from nearby points. Rendering further assistance to the war program by conserving vital freight car space, the Kansas City plant will save car-miles now consumed in the long distance shipping of:

1. Kraft pulp from the Pacific Northwest and South to paper mills in the East.
2. The completed bags from the East to the "Bread Basket of America."

Washington estimates that there will be a total saving of 513,000 car-miles annually.

In the complex and hazardous business of wartime shipping, delays are extremely dan-

gerous. Ships arrive with little advance notice and need flour . . . a cargo of flour must be packed, shipped and loaded so quickly that a minimum of time is available for shipment of the containers from the bag factory to the mill. The Kansas City plant will solve this problem for "bread basket" producers.

Producers of fertilizer in the mid-western area are among the many to benefit by the convenient location of the new St. Regis plant. Even before the war made it difficult to obtain textile bags and other types of containers, many fertilizer producers had already changed to the St. Regis Multiwall Bag as a more efficient and economical shipping method. St. Regis Paper Bags filled and closed by St. Regis Packers of the type best suited to the production schedule have long proved their ability to save time, money and labor for packers of all types of fertilizers.

Sulphuric Acid Output Increasing

Sulphuric acid production in the United States has reached a new high with total capacity now estimated at approximately 9,300,000 tons a year, the War Production Board has announced. In addition, new facilities with an estimated capacity of 800,000 tons yearly are under construction.

The total present capacity for private production (i. e., production by the user) is estimated by WPB officials to be approximately 706,000 tons per month, or 8,475,000 tons per year. Plants in this category now under construction and expected to be completed by the fourth quarter of 1944, are expected to increase these figures by 66,500 tons per month, or 798,000 tons per year, excluding ordnance acid, it was said. Reports from commercial plants (i.e., those producing sulphuric acid for sale) indicate operation at over 100 per cent rated capacity.

Definite requirements figures are still unavailable for 1944 but indications are that the following additional tonnage of sulphuric will be needed per month:

Superphosphate program	26,300
Ammonium sulphate	3,700
Rayon and cellulose film	8,300
Petroleum refineries	24,000
Titanium dioxide and other pigments	2,300
Chemicals	3,000
Iron and steel	13,400
Other metallurgical	1,000

WPB officials said that present indications were that all but 14,500 tons per month of the anticipated increase can be met.

Give Pastures an Opportunity to Feed Livestock Better*

By C. F. NOLL and S. I. BECHDEL

The one thing early American colonists found in abundance in the New World was grassland. For years their chief concern was to turn under this sod and transform vast acreages into cash crops—wheat, corn, oats. Grassland was so abundant that few thought of it as having any value. It was a thing to be converted into productive, tilled land. To find new grazing land was a simple matter of driving the herds to untouched areas.

Perhaps these circumstances explain the persistence of the feeling that to care for pastureland is not worth while in dollars and cents. Such an attitude has persisted long after the "passing of the frontier" in America. Only in recent years have American farmers been jostled into recognizing that good pasture management pays. Shortages of feeds, especially of protein, created by the war have forced farmers into putting this urgent question: How can pastures be made to produce better?

The Pennsylvania Departments of Agronomy and Dairy Husbandry in cooperation with the U. S. D. A. Bureau of Plant Industry now have evidence from 10 years' work on basic pasture fertilization studies to answer such a question. The experiments were conducted on Rayne soil, a silt loam representative of an extensive area of the Appalachian Plateau. The seed mixture used in establishing the test plots consisted of Kentucky bluegrass, Canada bluegrass, red top, timothy, and white, alsike and red clovers. Eight fertilizer treatments were tested: (1) lime alone; (2) lime and phosphorus; (3) lime, phosphorus, and potassium; and (4) lime, nitrogen (applied in three different amounts and two different frequencies), phosphorus, and potassium.

Results of the tests show that all of the fertilized pastures were more productive throughout the season than those which were unfertilized. Interesting results were obtained with varying applications of nitrogen, with phosphorus (P_2O_5), and with potassium (K_2O).

Nitrogen.—All of the applications of nitrogen increased yields markedly in May, and the heaviest application gave the most early growth. It was possible to begin grazing the nitrogen-fertilized pastures before the cattle

*From "Science for the Farmer," published by the Pennsylvania Agricultural Experiment Station, State College, Pa.

could be turned into the others. Only the pastures receiving the heaviest applications of nitrogen (72 lb. per acre) were consistently more productive after May, however, than those receiving only mineral fertilizer.

Twenty-four pounds of nitrogen, either in one or two applications, did not appreciably increase pasture yields; 48 pounds in both 1 and 2 applications gave a considerable increase; and 72 pounds in 2 applications gave a much larger increase.

Except for the heaviest applications, the chief effect of nitrogen appeared to be that of stimulating heavy growth early in the season. Under ordinary conditions, this is the time when pastures are at their best.

Treatments	Net Return Above Fertilizer Costs Based Upon Alfalfa Hay Nutrients	Net Return Above Fertilizer Costs Based Upon Milk Produced
1. L	$ 7.72	$14.58
2. L-P	12.51	31.58
3. L-P-K	12.98	33.51
4. L-N-P-K	11.17	26.86
5. L-N_2-P-K*	10.88	28.95
6. L-2N-P-K*	11.38	31.25
7. L-$2N_2$-P-K*	12.35	31.10
8. L-$3N_2$-P-K*	13.90	38.88

*2N = 48 pounds and 3N = 72 pounds annually; N_2, $2N_2$, and $3N_2$ indicate that one-half of the respective amounts was applied in April and the other half in July.

Phosphorus—Phosphoric Acid.—Sixty-four pounds of phosphoric acid per acre in superphosphate, applied on alternate years, gave a marked response in keeping with other fertilizer tests on residual soil. Phosphate gave much larger increases in yields than either nitrogen or potash, and the herbage from phosphate-treated pastures was much higher in phosphoric acid than from unfertilized pastures.

Potassium–Potash.—Potash, applied at the rate of 50 pounds per acre in muriate, gave a consistent increase in pasture yield.

An attempt was made in this study to determine the net return from the variously fertilized pastures above the cost of fertilization. This is done in two ways: (1) by comparing total digestible nutrients from the pastures with the costs of corresponding nutrients in alfalfa hay, and (2) by comparing the value of the milk from the pastures less the cost of the fertilizers and supplementary feed.

By both methods of computation, phosphate alone and phosphate with potash gave sizeable profits. The addition of nitrogen to the minerals did not increase net return except where the highest applications were made. Details of net returns per acre per year above cost of fertilizer may be found in the table.

Obituary

LOUIS A. BAILER

Louis A. Bailer, executive assistant vice-president of Swift & Company, died in Chicago on April 8th.

Mr. Bailer was a native of Ohio and joined the Swift organization in 1902, serving in the credit department at National Stock Yards, Ill. In 1912 he was transferred to the Atlanta office where he handled credits for the southern territory. Returning to Chicago in 1920, he had been executive assistant vice-president for the past 10 years.

Mr. Bailer had taken an active part in industry affairs for many years and had a wide circle of friends throughout the fertilizer business. He served on the Board of Directors of the National Fertilizer Association as well as on the Soil Improvement Committee, and was a regular attendant at the Association conventions. He is survived by his wife and by a son, Lt. Clifford F. Bailer, U. S. Army.

FERTILIZER MATERIALS MARKET

NEW YORK

Production of Principal Materials Is Being Maintained at High Levels. Fertilizer Manufacturers Taking All Allotments for Coming Months to Build Up Supplies. Labor Shortage Proving to be the Principal Bottleneck.

Exclusive Correspondence to "The American Fertilizer"

NEW YORK, April 20, 1944.

Sulphate of Ammonia

This material is being shipped in accordance with allocations. Production is holding at established levels and there is no accumulation of material as fertilizer manufacturers are taking every ton that is being allocated to them.

Nitrate of Soda

Allocated amounts are being taken care of by current deliveries and all essential requirements for April should be met. Supply conditions are favorable.

Potash

It looks as if fertilizer manufacturers will have adequate supplies of potash to finish up their spring business. The potash producers have maintained a high level of output, in spite of some handicaps by transportation and labor shortage. Demand continues and is expected to increase for agricultural, military and lend-lease purposes.

Superphosphate

Production figures for February show an increase and the requirements for the spring season seem to have been met. Manpower shortage has delayed some shipments. It is expected that production will be maintained at maximum through the coming months, in order to build up supplies for future needs.

Phosphate Rock

Manpower situation is still hindering production although producers have sufficient supplies mined to take care of all current shipments. Acidulators are still asking for full contract deliveries in order to maintain peak production.

Fish Products

The prospects for the coming season are uncertain, due to lack of crews to man the entire fishing fleet. Some sales are reported on a when-and-if-made basis.

BALTIMORE

Spring Tonnage Will Depend on Supply of Labor to Get Out Shipments. No Stocks of Any Materials Accumulating. No Change in Bag Situation.

BALTIMORE, April 18, 1944.

The spring season is now at its height, and all the manufacturers are experiencing more or less difficulty in securing ample labor to get out their shipments. From present indications it would appear that the season will be late due to inability to ship, and it is not a question as to how this year's tonnage will compare with that of last spring.

Ammoniates.—There is no change in the situation as all organics are going into the manufacture of feeding materials as fast as they are produced, and nothing suitable for feed is offering on the market for fertilizer use.

Castor Meal.—The situation is still tight and manufacturers are not taking on any additional business.

Fish Scrap.—There are reports there have been some sales at ceiling prices on new catch booked under usual provisions of subject to catch and for shipment "if and when made."

Sulphate of Ammonia.—Shipments are still being received against allocations, but none of the manufacturers have been able to secure as much tonnage as they desired.

Nitrate of Soda.—This article is likewise being allocated, and the market remains unchanged.

Superphosphate.—There are no stocks accumulating, and producers are not taking on any new business at ceiling price of 64 cents per unit of A. P. A. for run-of-pile, in bulk, f. o. b. seller's works.

Potash.—Outside of sulphate of potash, all manufacturers seem to be receiving ample supplies for their regular requirements.

Bone Meal.—The market is practically bare of both raw and steamed bone meal with demand almost nil.

Bags.—Up to the present time expected change in regulations authorizing use of burlap for fertilizer have not been announced, but this is looked forward to for the spring season, as due to the scarcity of cotton as well as paper, it looks as though many of the fertilizer manufacturers will have to resort to burlap bags again for the shipment of their product, particularly as the burlap situation seems to have eased up somewhat during the past month.

CHARLESTON

Heavy Rains Damage Crops and Slow Up Fertilizer Shipments. Ceiling Prices on Organic Materials but Supply Limited.

Exclusive Correspondence to "The American Fertilizer"

CHARLESTON, April 17, 1944.

Organics.—No additional supply of organic materials has come out.

Blood.—The market on this material is $5.53 per unit of ammonia ($6.72 per unit N), f. o. b. Chicago, Ill. There is an exceedingly limited supply.

Hoof Meal.—This material is very scarce and is quoted at $4.25 to $4.50 per unit of ammonia ($5.16½ to $5.47 per unit N), f. o. b. Chicago.

Orders for mixed fertilizers have fallen off considerably in the Southeast in the past two weeks, due to excessive rainfall, and in the truck belt the cabbage and potato farmers stand to lose a tremendous amount of money on account of the heavy rains.

CHICAGO

Almost No Future Trading in Fertilizer Organics. Price Ceilings Discourage Speculative Buying. Feed Demand Continues Good.

Exclusive Correspondence to "The American Fertilizer"

CHICAGO, April 17, 1944.

Any activity in the organics market appears remote. Sellers are in doubt as to probable future productions, and therefore are loath making offerings. This must be bonafide as the well established price ceilings obviate the possibility of any bullish tendency on part of producers.

Good demand at ceiling prices continues in feed materials, particularly wet and dry rendered tankage, and blood. No change is in evidence in the present tight situation in feed grains.

High grade ground fertilizer tankage, $3.85 to $4.00 ($4.68 to $4.86 per unit N) and 10 cents; standard grades crushed feeding tankage, $5.53 per unit ammonia ($6.72 per unit N); blood, $5.38 ($6.54 per unit N); dry rendered tankage, $1.21 per unit of protein, Chicago basis.

TENNESSEE PHOSPHATE

Inclement Weather Delays Planting and Mining. Flood of Orders Necessitates Selection in Scheduling Shipments.

Exclusive Correspondence to "The American Fertilizer"

COLUMBIA, TENN., April 16, 1944.

The series of spring winters continues to hold sway in this section and farmers are far behind in their work. Corn and tobacco on every side are waiting seasonable weather for planting, while much outside work in the phosphate mines is getting even farther behind than the curtailed manpower had already made it.

Shipments of all classes of phosphate rock into all consuming channels continue to the limit of manpower for loading.

Some agitation of the trucking carried on allegedly in violation of I. C. C. regulations, is curtailing that limited channel of distribution which has been used by many farmers from Northern States to supplement the inadequate rail shipments that can be loaded with limited manpower. This, however, cuts only a small percentage figure as, at the most, truck movement has amounted to only 5 or

10 per cent. It is hard, however, for any farmer who wants phosphate to be prevented from getting it because his trucker was not in business in 1927, and therefore cannot get a license.

The chief question now agitating ground phosphate rock producers is not where they can sell it, but which ones of the flood of orders should be given preference to effect the best and greatest food production for winning the war.

The Ruhm Phosphate & Chemical Co. is having a meeting at Mt. Pleasant, April 17th to 19th, of their key representatives, known as the Thousand Ton Club, about thirty-five coming from Illinois, Iowa, Missouri, Indiana Kentucky and Oklahoma. They will assist the local management in making proper selection of orders to ship, and will have a chance to get better acquainted with local conditions. They can then explain to their customers why certain shipments are made and others not.

The extra session of the Tennessee Legislature met and adjourned without any agitation of the proposed legislation to effect refilling of the phosphate cuts, so there is no fear of that coming out now before next regular session in 1945.

Representatives of the General Chemical Co. are still actively looking into various tracts of phosphate lands but so far no transactions have been recorded. As usual such visits stimulate local operators to greater activity in optioning and prospecting lands for future reserves.

The camp for war prisoners has been established nearer to Lawrenceburg instead of at the site of the old Napier Iron Furnace so it is farther away from the phosphate area by about ten miles and there is greater difficulty in arranging for surplus labor for the mines. So far, nothing has developed to relieve the situation under which it is now possible to load only about 70 per cent of that part of the output which has to be shipped in boxcars.

Minor Element Experiment in Delaware

In an experiment with minor elements at the University of Delaware, Professor E. P. Brasher found that lime was detrimental to the production of tomatoes. When he used 1,000 lb. of hydrated lime per acre on a soil having a pH of 5.6 the yield of tomatoes was significantly reduced. When copper and iodine were used, the yields likewise were reduced but not significantly. Small amounts of magnesium, manganese, and boron increased the yields. Of these, however, only boron produced a significant increase.

POTASH ALLOCATION ORDER AMENDED

(*Continued from page 10*)

salt delivered by him to such person during the corresponding period in the 12 months ending March 31, 1944. Any potash so delivered or received must be charged (1) against the amounts covered by specific authorizations that may be issued and (2) against any amount which may be received or delivered pursuant to item (a) above. This exception is apparently intended to take care of deliveries during the first part of any period while WPB is processing the applications for that period.

For conservation purposes, WPB may issue directions to any person respecting deliveries, storage, transportation, and shipping routes.

The prohibitions and restrictions with respect to deliveries apply to deliveries to other persons and also to intra-company deliveries.

Applications, reports, appeals, and all other communications concerning the Order must be sent to: War Production Board, Chemicals Bureau, Washington 25, D. C.

by a Board of District Supervisors, composed of five members. Three of these members are elected by popular vote within the district and two members are appointed by the State Soil Conservation Committee. Where is the "federal regimentation" here?

The supervisors go to work with the farmers to develop a soil conservation program for the district. They decide for themselves what they want to do, when they want to do it, and how they want to do it. And because they are working together, in full cooperation with one another, they are able to carry on a constructive program that will get things done.

Technical Services Offered

Now here is where the technical services of the Soil Conservation Service come in. It happens very often that the supervisors and farmers of a district decide they want some technical assistance in carrying out their program. In that case they may ask the Department of Agriculture for it, and if a technician is available, he can be assigned to work in the district. In the same way, a district may request—and receive—assistance in forestry problems from forestry agencies, in educational problems from the Extension Service, in roadside problems from the Highway Department, and so on. Farmers working together on a common problem are able to get more help and get more done than when they work independently and alone. That has been true ever since the days of the Pilgrim Fathers and district organization is in the best tradition of America. In this country, men and women have always banded together, in a free and voluntary manner, to accomplish worthy objectives and the wishes of the majority. This is the very spirit of democracy.

Today, 45 States have soil conservation district laws. Under the provisions of these laws, farmers have organized—by their own votes—more than 1,000 soil conservation districts. More than 2,500,000 farms or ranches, covering more than 500,000,000 acres, are now within district boundaries. Farmers have made a magnificent start on this prodigious problem. This is the best kind of evidence, I think, that farmers recognize the urgency of controlling erosion. Farmers know, better than anyone else, that soil conservation work cannot be done out on the land unless somebody goes out and does it. They know, too, that educational processes and meetings alone will not plug any gullies. They remember that educational processes and meetings alone never plugged any gullies in the past.

A Common Fund of Information

Soil conservation technicians are helping farmers solve their erosion problems out in the fields and pastures where the erosion occurs. That is where it counts, where actual results can be obtained.

New and better ways of controlling erosion which may be developed in Iowa are promptly made available to technicians working with soil conservation districts in Pennsylvania and in other States. When a better method is discovered in Pennsylvania, it is made available right away to the technicians in every other part of the country.

The same is true of discoveries and developments at the soil conservation experiment stations, which are conducted cooperatively by the State Agricultural Experiment Stations and the Department of Agriculture. Department conservation nurseries test new and promising grasses and plants for erosion control. Heavy machinery and equipment, which may be essential for two weeks or two months in a soil conservation district, is made available by the Service and then is moved on to the next district in some other part of the State or in the next State. Technicians are moved, too, from one district to another, as needs develop or dwindle.

In these and many other ways, we in the United States are carrying forward a highly efficient, nationwide program of soil conservation. The same high technical standards of work prevail in all States throughout the country and the so-called overhead costs are kept to a minimum. Add to this work the conservation achievements of other national agencies, such as the Agricultural Adjustment Agency and the Forest Service, and the total

conservation effort is all the more significant.

How different it would be if we had 48 independent soil conservation services each with different technical standards, and each attempting to maintain its own corps of technicians, experiment stations, nurseries, stocks of heavy machinery and equipment, and its own administrative organization for this work. Think how the costs would go up and the technical standards would begin to waver. Perhaps for financial or political or other reasons some States might even abandon the program.

America's Great Opportunity

The United States is a great nation because it was richly endowed with natural resources and because Americans are people of great ingenuity. I believe we shall always have our ingenuity, but we can lose our natural resources. We can conserve these resources, if everyone will take an interest and do his part. In this job there is plenty of room for all to serve.

For many months, I have been urging that we in America emphasize those undertakings which will at once contribute most toward the winning of the war and, at the same time, help us forward toward our great peacetime objectives. Soil conservation is such an undertaking. Today it is giving us greater production of food and fiber for war, and at the same time it is protecting and improving the land for all the years to come. Some day our victorious men will be coming home, and we shall turn to the business of building a better life and a better country than we have ever had before. When that day comes, you will find that conservation of our soil is still high on the list of the great unfinished jobs of America. Remember that it is a big job and a necessary job—as big and as necessary as America itself.

WORLD FOOD NEEDS AND WHO SHOULD SUPPLY THEM

(Continued from page 7)

war, thus cutting down the need for fats and animal foods.

Vegetarian Diet Must Be Preserved Temporarily

If we can preserve, temporarily, the emphasis on production and use of vegetable foods, Europe should be able to supply from four-fifths to seven-eighths of her minimum food needs in the first two years after Germany's defeat. This dietary policy, rigidly carried out, has enabled the German Reich to hold out under a fifth year of war. To maintain adequately a minimum diet of 2,000 calories a day for Europeans would, in the first two years after the war's end, require about 8,500,000 or 9,000,000 tons of food, of which 5,000,000 to 5,500,000 tons should be grains; about 500,000 tons, fats and oils; 700,000 to 800,000 tons, meats, fish, and cheese; the equivalent of 1,600,000 tons, fluid milk (chiefly in the form of dried milk and condensed milk); about 300,000 tons, beans and peas; 400,000 tons, sugar; and other items with a high-nutritive value. Of these, fats and oils would be hardest to obtain as the amount needed represents about 18 per cent of probable U. S. civilian consumption. Enough to last one year could probably be made available out of surplus stocks now being piled up in the British Empire, Latin America, and the United States.

The milk production called for would need to come largely from us. This represents about 3 per cent of our annual production. It too could come largely from surplus concentrated and dried milk stocks, and from skim milk and buttermilk which customarily are largely fed to farm animals.

The needed wheat could be supplied en-

tirely by Canada, or by Canada with some from Argentina, Australia, and possibly the United States. Our share in world wheat exports dropped from a five-year average of 170,000,000 bushels in 1925–29 to less than 34,000,000 bushels in 1940.

Vegetable protein would be furnished easily by soybeans from the United States, and other beans and peas from Mexico, Brazil, Argentina, Peru, and Chile. The 400,000 tons of sugar needed in Europe might come from existing U. S. stocks, supplies in Cuba, Hawaii, and Latin America, and from the possible re-opening of the Philippines, as well as from a reduction in use for alcohol manufacture at the close of the war. Beet sugar production will be resumed promptly in Europe.

Far East a Separate Problem

The food situation in the Far East will depend almost entirely on the re-opening of the customary sources of supply for that area. The South Pacific islands normally produce enough of certain foods, particularly rice and sugar, to meet most of the import needs of the various Asiatic countries. Burma, Indo-China, and the islands of Southeast Asia comprise food surplus areas whose major output is rice, edible oils, and similar materials. Australia and New Zealand and the South American countries can help to supply the Far East provided (and this applies to the whole world) the facilities for international exchange are made available to all nations without crippling discriminations.

India, Japan, China, and perhaps densely-populated, one-crop Java will present varied and difficult problems. India and China have great production potentialities in their unused agricultural soils. Japan and Java have such small areas of cultivable soil per capita that they present special problems. Japan, for instance, normally imports only about $100,000,000 worth of foodstuffs per annum, while United Kingdom, with far less population, imports between $2,000,000,000 and $3,000,000,000 worth.

Difficult and Keen Competition Will Recur

It must be remembered that after the war governments will direct and control foreign trade to an extent never before experienced. We are familiar with the assistance Great Britain has given her business people in the past through her Board of Trade and other agencies. The Board is really a perfected Department of Commerce.

Other countries will utilize cartels in one way or another to direct and manage their export and import business. Russia concentrates all her foreign trade in one governmental agency; she will be an important factor in the future and individual enterprisers will probably be at a disadvantage in trying to deal with so powerful an agency.

Pre-war trade preferences, such as are provided by the Ottawa Agreements, will return. Assuming restoration of the French Empire, France as before will channel all possible trade to France through French channels. The Netherlands will resume their active role and Russia, an awakened giant, will seek an ever-enlarged place especially in Europe and Asia.

As our wage rates and price levels are always high compared to the rest of the world, our position may be particularly difficult. Certainly, with a vast supply of commercial shipping available in the world, competition between countries may express itself sharply.

Conclusion

There seems to be an almost world-wide expectation that we shall be the military arsenal, the food warehouse, and the money lender to supply the many needy (and some not so needy) nations of the world. If we accept the responsibilities that are implied, we create world-wide expectations which if we are not able to make good will destroy whatever confidence the nations of the world may have in us. Our duty is to make available to meet world needs that maximum quantity of foods which does not impose malnutrition upon our own people nor destroy our soil resources by robbing our land of plant foods beyond what we can reasonably hope to restore by good farming practices and by the use of fertilizer.

A MIXED FERTILIZER with one of the "big three"—N, P, or K—weak or short, is like a three-legged stool with a weak, short leg.

The nitrogen leg in a fertilizer may be short through failure to include sufficient nitrogen. It may be weak because the right kinds of nitrogen are not used.

You can keep the nitrogen leg of your fertilizer from being short simply by adding *enough* nitrogen. But to make the leg strong requires proper choice of sources of nitrogen. When making that choice, consider UREA nitrogen. It will add strength because it is—

- **Completely available as plant food**
- **Resistant to leaching—available over long periods**
- **Low in equivalent acidity**

Du Pont offers two good sources of UREA nitrogen in "URAMON" fertilizer compound, and UREA-AMMONIA LIQUORS. E. I. du Pont de Nemours & Co. (Inc.), Ammonia Department, Wilmington 98, Del.

DU PONT
URAMON
FERTILIZER COMPOUND
UREA-AMMONIA LIQUORS

DU PONT BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

REG. U.S. PAT. OFF.

BUYERS' GUIDE • A CLASSIFIED INDEX TO ALL THE ADVERTISERS IN "THE AMERICAN FERTILIZER"

This list contains representative concerns in the Commercial Fertilizer Industry, including fertilizer manufacturers, machinery and equipment manufacturers, dealers in and manufacturers of commercial fertilizer materials and supplies, brokers, chemists, etc.
For Alphabetical List of Advertisers, see page 33.

ACID BRICK
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

ACID EGGS
Chemical Construction Corp., New York City.

ACIDULATING UNITS
Chemical Construction Corp., New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.

AMMO-PHOS
American Cyanamid Co., New York City.

AMMONIA—Anhydrous
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.
Hydrocarbon Products Co., New York City.

AMMONIA LIQUOR
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.
Hydrocarbon Products Co., New York City.

AMMONIA OXIDATION UNITS
Chemical Construction Corp., New York City.

AMMONIATING EQUIPMENT
Sackett & Sons Co., The A. J., Baltimore, Md.

AMMONIUM NITRATE SOLUTIONS
Barrett Division, The, Allied Chemical & Dye Corp., New York City.

AUTOMATIC ELEVATOR TAKEUPS
Sackett & Sons Co., The A. J., Baltimore, Md.

BABBITT
Sackett & Sons Co., The A. J., Baltimore, Md.

BAGS AND BAGGING—Manufacturers
Bagpak, Inc., New York City.
Bemis Bro. Bag Co., St. Louis, Mo.
St. Regis Paper Co., New York City.
Textile Bag Mfrs. Association, Chicago, Ill.
Union Bag & Paper Corporation, New York City.

BAGS—Cotton
Bemis Bro. Bag Co., St. Louis, Mo.
Textile Bag Mfrs. Association, Chicago, Ill.

BAGS—Paper
Bagpak, Inc., New York City
Bemis Bro. Bag Co., St. Louis, Mo.
St. Regis Paper Co., New York City.
Union Bag & Paper Corporation, New York City.

BAGS (Waterproof)—Manufacturers
Bemis Bro. Bag Co., St. Louis, Mo.
St. Regis Paper Co., New York City.
Textile Bag Mfrs. Association, Chicago, Ill.
Union Bag & Paper Corporation, New York City.

BAGS—Dealers and Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Wellmann, William E., Baltimore, Md.

BAG CLOSING MACHINES
Bagpak Inc., New York City.
St. Regis Paper Co., New York City.

BAGGING MACHINES—For Filling Sacks
Atlanta Utility Works, East Point, Ga.
Bagpak, Inc., New York City.
St. Regis Paper Co., New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.

BAG PILERS
Link-Belt Company, Philadelphia, Chicago.

BEARINGS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

BELT LACING
Sackett & Sons Co., The A. J., Baltimore, Md.

BELTING—Chain
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

BELTING—Leather, Rubber, Canvas
Sackett & Sons Co., The A. J., Baltimore, Md.

BOILERS—Steam
Atlanta Utility Works, East Point, Ga.

BONE BLACK
American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Huber & Company, New York City.

BONE PRODUCTS
American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

BORAX AND BORIC ACID
American Potash and Chem. Corp., New York City
Pacific Coast Borax Co., New York City.

BROKERS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Dickerson Co., The, Philadelphia, Pa.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
Keim, Samuel L., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

BUCKETS—Elevator
Link-Belt Company, Philadelphia, Chicago
Sackett & Sons Co., The A. J., Baltimore, Md
Stedman's Foundry and Mach. Works, Aurora, Ind

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BUYERS' GUIDE

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BUCKETS—For Hoists, Cranes, etc., Clam Shell, Orange Peel, Drag Line, Special; Electrically Operated and Multi Power
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.

BURNERS—Sulphur
Chemical Construction Corp., New York City.

BURNERS—Oil
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.

CABLEWAYS
Hayward Company, The, New York City.

CARBONATE OF AMMONIA
American Agricultural Chemical Co., New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.

CARS—For Moving Materials
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CARTS—Fertilizer, Standard and Roller Bearing
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

CASTINGS—Acid Resisting
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.

CASTINGS—Iron and Steel
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CEMENT—Acid-Proof
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

CHAIN DRIVES—Silent
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHAINS AND SPROCKETS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHAMBERS—Acid
Chemical Construction Corp., New York City
Fairlie, Andrew M., Atlanta, Ga.

CHEMICAL APPARATUS
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

CHEMICALS
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
Bradley & Baker, New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.
Huber & Company, New York City.

CHEMICALS—Continued
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Phosphate Mining Co., The, New York City.
Wellmann, William E., Baltimore, Md.

CHEMICAL PLANT CONSTRUCTION
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind

CHEMISTS AND ASSAYERS
Gascoyne & Co., Baltimore, Md.
Shuey & Company, Inc., Savannah, Ga.
Stillwell & Gladding, New York City.
Wiley & Company, Baltimore, Md.

CLUTCHES
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind

CONCENTRATORS—Sulphuric Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

CONDITIONERS AND FILLERS
American Limestone Co., Knoxville, Tenn.
Dickerson Co., The, Philadelphia, Pa.
Phosphate Mining Co., The, New York City

CONTACT ACID PLANTS
Chemical Construction Corp., New York City

COPPER SULPHATE
Tennessee Corporation, Atlanta, Ga.

COTTONSEED PRODUCTS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

CRANES AND DERRICKS
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

CYANAMID
American Agricultural Chemical Co., New York City
American Cyanamid Co., New York City.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Jett, Joseph C., Norfolk, Va.
Wellmann, William E., Baltimore, Md.

DENS—Superphosphate
Chemical Construction Corp., New York City.
Stedman's Foundry and Mach. Works, Aurora, Ind.

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DISINTEGRATORS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

DRYERS—Direct Heat
Sackett & Sons Co., The A. J., Baltimore, Md.

DRIVES—Electric
Link-Belt Company, Philadelphia, Chicago.

DUMP CARS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

DUST COLLECTING SYSTEMS
Sackett & Sons Co., The A. J., Baltimore, Md.

ELECTRIC MOTORS AND APPLIANCES
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

ELEVATORS
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

ELEVATORS AND CONVEYORS—Portable
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

ENGINEERS—Chemical and Industrial
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

ENGINES—Steam
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

EXCAVATORS AND DREDGES—Drag Line and Cableway
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Link Belt Speeder Corp., Chicago, Ill., and Cedar Rapids, Iowa.

FERTILIZER MANUFACTURERS
American Agricultural Chemical Co., New York City.
American Cyanamid Company, New York City.
Armour Fertilizer Works, Atlanta, Ga.
Farmers Fertilizer Company, Columbus, Ohio.
International Minerals and Chemical Corporation, Chicago, Ill.
Phosphate Mining Co., The, New York City.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

FISH SCRAP AND OIL
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Wellmann, William E., Baltimore, Md.

FOUNDERS AND MACHINISTS
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

GARBAGE TANKAGE
Wellmann, William E., Baltimore, Md.

GEARS—Machine Moulded and Cut
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

GEARS—Silent
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

GELATINE AND GLUE
American Agricultural Chemical Co., New York City.

GUANO
Baker & Bro., H. J., New York City.

HOISTS—Electric, Floor and Cage Operated, Portable
Hayward Company, The, New York City.

HOPPERS
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

IMPORTERS, EXPORTERS
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Wellmann, William E., Baltimore, Md.

IRON SULPHATE
Tennessee Corporation, Atlanta, Ga.

INSECTICIDES
American Agricultural Chemical Co., New York City.

LACING—Belt
Sackett & Sons Co., The A. J., Baltimore, Md.

LIMESTONE
American Agricultural Chemical Co., New York City.
American Limestone Co., Knoxville, Tenn.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
McIver & Son, Alex. M., Charleston, S. C.
Wellmann, William E., Baltimore, Md.

LOADERS—Car and Wagon, for Fertilizers
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Acid Making
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.
Duriron Co., Inc., The, Dayton, Ohio.
Fairlie, Andrew M., Atlanta, Ga.
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Coal and Ash Handling
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Elevating and Conveying
Atlanta Utility Works, East Point, Ga.
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Grinding and Pulverizing
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

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MACHINERY—Power Transmission
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Pumping
Atlanta Utility Works, East Point, Ga.
Duriron Co., Inc., The, Dayton, Ohio.

MACHINERY—Tankage and Fish Scrap
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MAGNETS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MANGANESE SULPHATE
McIver & Son, Alex. M., Charleston, S. C.
Tennessee Corporation, Atlanta, Ga.

MIXERS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

NITRATE OF SODA
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
Bradley & Baker, New York City.
Chilean Nitrate Sales Corp., New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

NITRATE OVENS AND APPARATUS
Chemical Construction Corp., New York City.

NITROGEN SOLUTIONS
Barrett Division, The, Allied Chemical & Dye Corp., New York City.

NITROGENOUS ORGANIC MATERIAL
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
DuPont de Nemours & Co., Wilmington, Del.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Smith-Rowland Co., Norfolk, Va.
Wellmann, William E., Baltimore, Md.

NOZZLES—Spray
Monarch Mfg. Works, Philadelphia, Pa.

PACKING—For Acid Towers
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

PANS AND POTS
Stedman's Foundry and Mach. Works, Aurora, Ind.

PHOSPHATE MINING PLANTS
Chemical Construction Corp., New York City.

PHOSPHATE ROCK
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Coronet Phosphate Co., New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Phosphate Mining Co., The, New York City.
Ruhm, H. D., Mount Pleasant, Tenn.
Schmaltz, Jos. H., Chicago, Ill.
Southern Phosphate Corp., Baltimore, Md.
Virginia-Carolina Chemical Corp. (Mining Dept.), Richmond, Va.
Wellmann, William E., Baltimore, Md.

PIPE—Acid Resisting
Duriron Co., Inc., The, Dayton, Ohio.

PIPES—Chemical Stoneware
Chemical Construction Corp., New York City.

PIPES—Wooden
Stedman's Foundry and Mach. Works, Aurora, Ind.

PLANT CONSTRUCTION—Fertilizer and Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

POTASH SALTS—Dealers and Brokers
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

POTASH SALTS—Manufacturers
American Potash and Chem. Corp., New York City.
Potash Co. of America, New York City.
International Minerals & Chemical Corp., Chicago, Ill.
United States Potash Co., New York City.

PULLEYS AND HANGERS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

PUMPS—Acid-Resisting
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

PYRITES—Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., New York City.
Wellmann, William E., Baltimore, Md.

QUARTZ
Charlotte Chem. Laboratories, Inc., Charlotte, N. C

RINGS—Sulphuric Acid Tower
Chemical Construction Corp., New York City.

ROUGH AMMONIATES
Bradley & Baker, New York City.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

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SCALES—Including Automatic Bagging
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SCRAPERS—Drag
Hayward Company, The, New York City.

SCREENS
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SEPARATORS—Air
Sackett & Sons Co., The A. J., Baltimore, Md.

SEPARATORS—Including Vibrating
Sackett & Sons Co., The A. J., Baltimore, Md.

SEPARATORS—Magnetic
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SHAFTING
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SHOVELS—Power
Link-Belt Company, Philadelphia, Chicago.
Link-Belt Speeder Corporation, Chicago, Ill., and Cedar Rapids, Iowa.
Sackett & Sons Co., The A. J., Baltimore, Md.

SPRAYS—Acid Chambers
Monarch Mfg. Works, Inc., Philadelphia, Pa.

SPROCKET WHEELS (See Chains and Sprockets)

STACKS
Sackett & Sons Co., The A. J., Baltimore, Md.

SULPHATE OF AMMONIA
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Hydrocarbon Products Co., New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

SULPHUR
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Freeport Sulphur Co., New York City.
Texas Gulf Sulphur Co., New York City.

SULPHURIC ACID
American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M. Charleston, S. C.

SULPHURIC ACID—Continued
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Wellmann, William E., Baltimore, Md.

SUPERPHOSPHATE
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Wellmann, William E., Baltimore, Md.

SUPERPHOSPHATE—Concentrated
Armour Fertilizer Works, Atlanta, Ga.
International Minerals & Chemical Corporation, Chicago, Ill
Phosphate Mining Co., The, New York City.
U. S. Phosphoric Products Division, Tennessee Corp Tampa, Fla.

SYPHONS—For Acid
Monarch Mfg. Works, Inc., Philadelphia, Pa.

TALLOW AND GREASE
American Agricultural Chemical Co., New York City.

TANKAGE
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Smith-Rowland, Norfolk, Va.
Wellmann, William E., Baltimore, Md.

TANKAGE—Garbage
Huber & Company, New York City.

TANKS
Sackett & Sons, Co., The A. J., Baltimore, Md.

TILE—Acid-Proof
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.

TOWERS—Acid and Absorption
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

UNLOADERS—Car and Boat
Hayward Company, The, New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.

UREA
DuPont de Nemours & Co., E. I., Wilmington, Del.

UREA-AMMONIA LIQUOR
DuPont de Nemours & Co., E. I., Wilmington, Del.

VALVES—Acid-Resisting
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

WHEELBARROW (See Carts)

ZINC SULPHATE
Tennessee Corporation, Atlanta, Ga.

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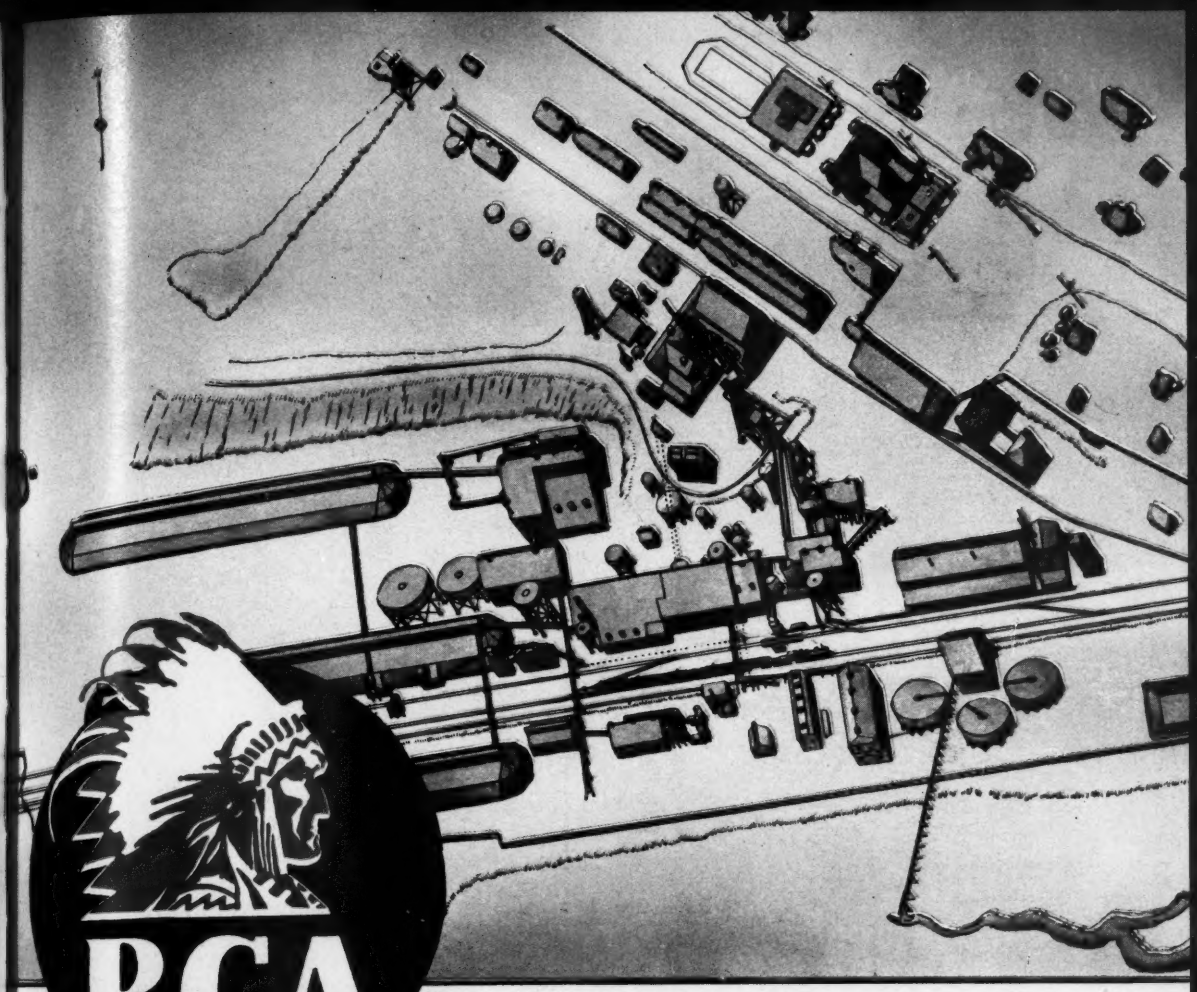

Above is a bird's eye view of the plant at Carlsbad, N. M. where Potash Company of America mines and refines its products.

And at left is the Red Indian trade-mark of Potash Company of America which identifies Potash products of uniformly high quality.

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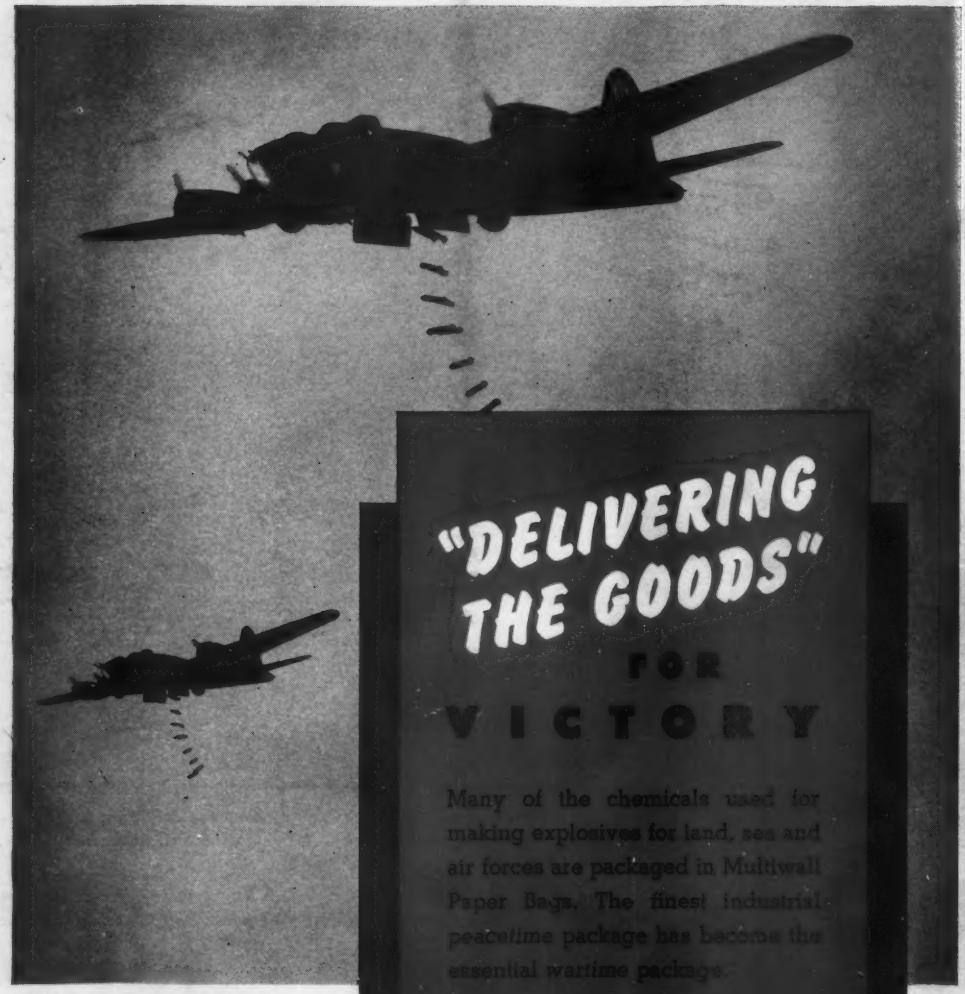

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